

# **SECTION 1 – 5**

## **Formulas in Geometry**

# OBJECTIVE

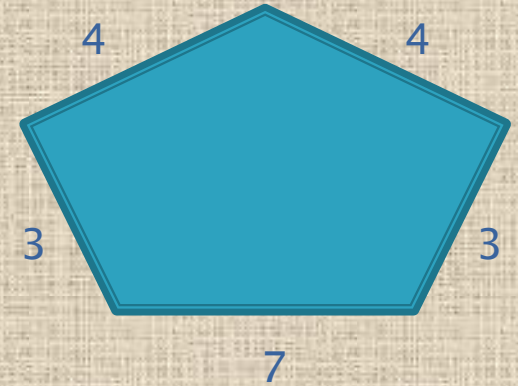


To practice using basic formulas to find perimeter, area, and circumference

# VOCABULARY

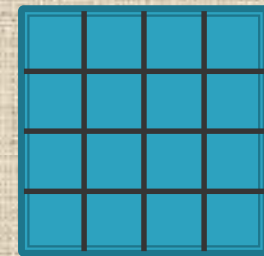
Perimeter – sum of the lengths of the sides of a polygon

$$\text{Perimeter} = 4 + 4 + 3 + 3 + 7 = 21$$



Area – number of square units the figure encloses

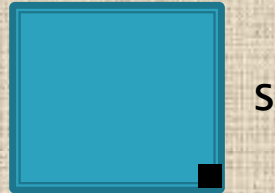
$$\text{Area} = 16 \text{ units}^2$$



# FORMULAS

▶ Square:

- $P = 4s$
- $A = s^2$



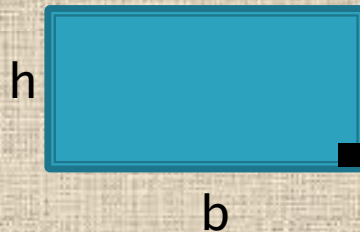
P= Perimeter

A = Area

s = side

▶ Rectangle:

- $P = 2b + 2h$
- $A = bh$



b = base

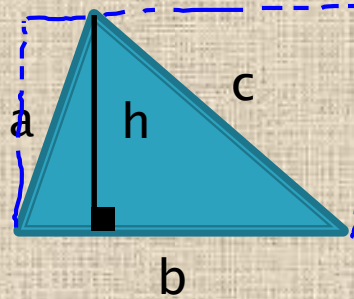
h = height

(altitude)

# FORMULAS

## ▶ Triangle:

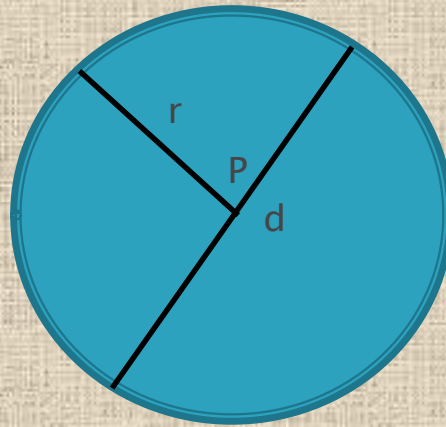
- $P = a + b + c$
- $A = \frac{1}{2}bh$



b = base  
h = height  
(altitude)

## ▶ Circle:

- $C = \pi d$  or  $2\pi r$
- $A = \pi r^2$

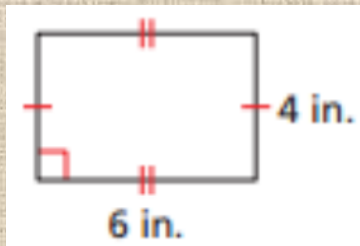


C = Circumference  
d = diameter  
r = radius

# EXAMPLES

Find the perimeter and area of each figure.

1.



$$P = 2b + 2h$$

$$P = 2(6) + 2(4)$$

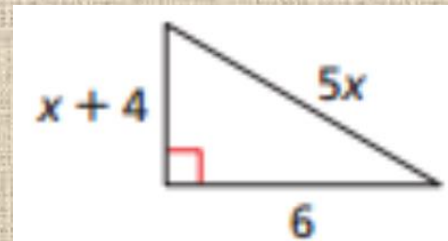
$$P = 20 \text{ in.}$$

$$A = bh$$

$$A = 6(4)$$

$$A = 24 \text{ in}^2$$

2.



$$P = a + b + c$$

$$P = x + 4 + 5x + 6$$

$$P = (6x + 10) \text{ un.}$$

$$A = \frac{1}{2}bh = \frac{1}{2}(6)(x + 4)$$

$$A = 3(x + 4) = (3x + 12) \text{ un}^2$$

# EXAMPLES

3. Find the circumference and area of a circle with radius 8 cm. Use the  $\pi$  key on your calculator. Then round the answer to the nearest tenth.

$$C = 2\pi r$$

$$C = 2\pi(8)$$

$$C = 16\pi$$

$$C \approx 50.3\text{cm.}$$

$$A = \pi r^2$$

$$A = \pi(8)^2$$

$$A = 64\pi$$

$$A \approx 201.1\text{cm}^2$$

4. The Queens Quilt block includes 12 blue triangles. The base and height of each triangle are about 4 in. Find the approximate amount of fabric used to make the 12 triangles.

$$A = 12 \text{ triangles}$$

$$A = 12\left(\frac{1}{2}\right)bh$$

$$A = 12\left(\frac{1}{2}\right)(4)(4)$$

$$A = 96\text{in}^2$$

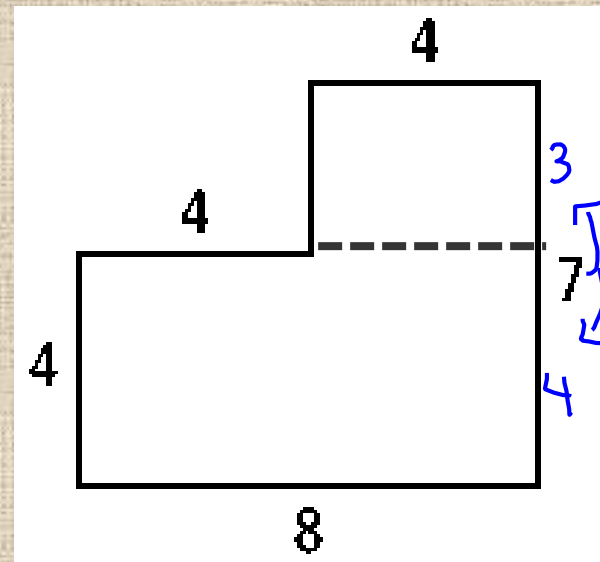
# AREA ADDITION POSTULATE

The area of a region is the sum of the areas of its non-overlapping parts.

$$A = 4(8) + 3(4)$$

$$A = 32 + 12$$

$$A = 44 \text{ units}^2$$





# REWRITING FORMULAS

We can rewrite a formula to solve for other variables in the formula. This is a very common type of questioning. You are given the “answer” and are asked to give one of the other variables in the formula. For example, you may be given the area and base length of a rectangle, then are asked to solve for the height of the rectangle.

Example:

A triangle with area 24 square inches has a base of 3 inches. What is its height?

Step one: Solve formula for variable

Write the original formula

$$A = \frac{1}{2}bh$$

Multiply each side by 2.

$$2A = bh$$

Divide each side by b.

$$\frac{2A}{b} = h$$

Step 2: Use rewritten formula to solve problem

$$\frac{2A}{b} = h$$

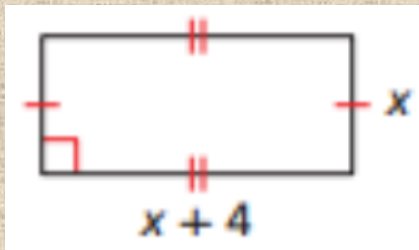
$$\frac{2(24)}{3} = h$$

$$h = 16 \text{ inches}$$

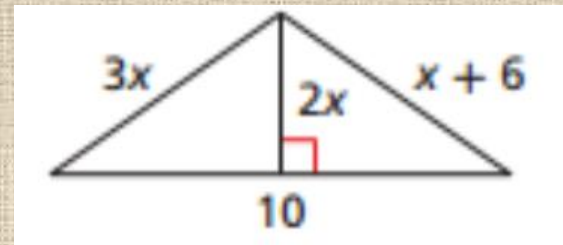
# CLASS WORK

For 1 and 2, find the perimeter and area of the figure.

1.



2.



3. Find the circumference and area of a circle with a diameter of 12 feet. Leave your answer in terms of  $\pi$ .

4. The area of a rectangle is  $74.82 \text{ in}^2$ , and the length is 12.9 in. Find the width.

# ANSWER SLIDE

$$\begin{aligned}1) P &= 2b + 2h \\ P &= 2(x + 4) + 2x \\ P &= 2x + 8 + 2x \\ P &= (4x + 8) \text{ un.}\end{aligned}$$

$$\begin{aligned}A &= bh \\ A &= (x + 4)(x) \\ A &= (x^2 + 4x) \text{ un}^2\end{aligned}$$

$$\begin{aligned}2) P &= a + b + c \\ P &= 3x + x + 6 + 10 \\ P &= (4x + 16) \text{ un.}\end{aligned}$$

$$A = \frac{1}{2}bh = \frac{1}{2}(10)(2x) = 10x \text{ un}^2$$

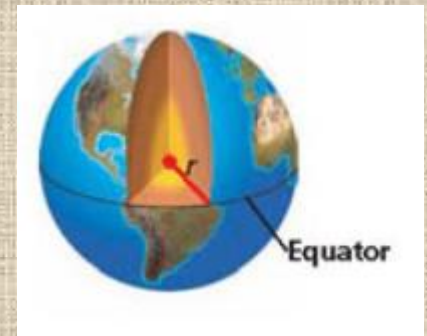
$$\begin{aligned}3) C &= \pi d \\ C &= 12\pi \text{ ft.}\end{aligned}$$

$$\begin{aligned}A &= \pi r^2 \\ A &= \pi(6)^2 \\ A &= 36\pi \text{ ft}^2\end{aligned}$$

$$\begin{aligned}4) A &= lw \\ w &= \frac{A}{l} \\ w &= \frac{74.82}{12.9} \\ w &= 5.8 \text{ in.}\end{aligned}$$

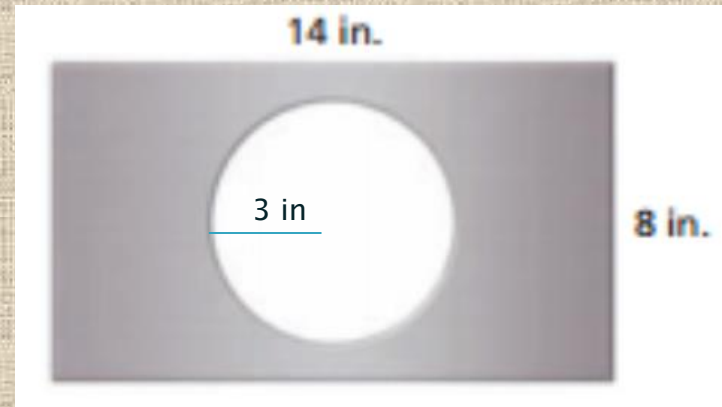
# CLASS WORK

5. **Geography** The radius  $r$  of the earth at the equator is approximately 3964 mi. Find the distance around the earth at the equator. Use the  $\pi$  key on your calculator and round to the nearest mile.



# CHALLENGE AND EXTEND

A circle with a 6 inch diameter is stamped out of a rectangular piece of metal as shown. Find the area of the remaining piece of metal. Use the  $\pi$  key on your calculator and round to the nearest tenth.



$$A = \text{rectangle} - \text{circle}$$

$$A = bh - \pi r^2$$

$$A = 14(8) - \pi(3)^2$$

$$A = 112 - 9\pi$$

$$A \approx 83.7 \text{ in}^2$$

# LEARNING RUBRIC

- ▶ Got It: Represents and applies formulas and Area Addition Postulate to complex/real world situations
- ▶ Almost There: Rewrites a formula to solve for another variable
- ▶ Moving Forward: Uses formulas when all variables given without expressions
- ▶ Getting Started: Uses formulas when all variables given without expressions

# HOMework

- ▶ Pages 38 – 41
- ▶ 6, 12, 20, 22, 28, 30, 42, 44, 50, 52